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# HOW TO DO IT.

SOME SUGGESTIONS

ON

# HOUSE SANITATION

BEING A PAPER PREPARED FOR THE ASSOCIATION OF EXECUTIVE  
HEALTH OFFICERS OF ONTARIO,

BY

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*Queen's University at Kingston*

# HOW TO DO IT.

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## SOME SUGGESTIONS

ON

# HOUSE SANITATION

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IN thousands of cases in our cities with their Sewer Systems, Boards of Health, Plumbing Inspectors, etc., we still find the liquid house wastes distributed over the back yards or deposited in the privy pit with the night soil, the night soil allowed to accumulate for months, perhaps years, within a few yards of residences; the kitchen garbage and ashes commingling, forming a disgusting heap, all the conditions necessary for propagating if not creating an epidemic.

If the perpetrators of the foregoing crimes were the only ones to suffer, the evil might soon be eradicated or would exterminate the criminals eventually, but unfortunately the results affect others, the innocent suffering with the guilty.

The objects of this paper are to shew that the abominations described in the opening paragraph and which are known by all city officials to exist, need exist no longer; that by the general adoption of the methods described in this paper a great advance would be made in civic sanitation.

It is assumed that the city or town is supplied with water works and a sewerage system, without both of which it is impossible for a city or town to attain to a high sanitary condition.

The adoption of water closets and plumbing fixtures by a small part or even half the population of a city, while the remaining portion of the population still adheres to the more primitive and time-honored methods of disposing of refuse and wastes, could not, in my opinion, avert the dangers from certain epidemic diseases.

Sanitation to be effective should be general, and should provide for the poor as well as for the rich. We shall now attempt to show "How to do it."

After a careful study of the problem, based on several years of experience, the writer has concluded that every resident of a city or town should be compelled in the interests of public health to keep his house and his premises in as perfect a sanitary condition as possible.

This may be done :—

(a) By removing all liquid wastes daily. These wastes include chamber slops, water used for baths, clothes-washing, dish-washing, pot-washing, vegetable-washing, and the thousand and one other uses to which water is put in a house.

(b) By deodorizing, disinfecting and removing quietly, periodically, regularly and without offence to any of the senses, all night soil.

(c) By burning all combustible garbage and removing by carts all that is not combustible.

(d) By removing ashes periodically.

(e) By the continuous removal of the subsoil water that causes damp cellars, basements, etc.

The construction of a system of sewerage in a city or town will tend to lower the subsoil water ; but it will do little more towards improving its sanitary condition unless a great majority of the citizens take advantage of such system and use the sewers as a means of removing all liquid house wastes at least. Until recent years the ordinary house plumbing with enclosed fixtures, sheet-

metal pipes, putty joints, bath rooms badly lighted and ventilated, and soil pipes of inferior materials was a continuous source of expense and danger to the inmates of houses so supplied; design, materials and workmanship were all at fault.

In many cities of Great Britain, Europe and the United States, and in two or three cities in Canada, plumbing rules and regulations are now enforced specifying how all plumbing work must be done, thus protecting the citizen from unseen danger, and guaranteeing to him that he is getting what he is paying for, as well as protecting the honest plumber from the "scamp" plumber, and demonstrating to the public that plumbing fixtures can be so arranged and constructed that they will become neither dangerous or offensive if properly used and if kept clean.

With a system of sewers and proper plumbing fixtures (*a*) and (*b*) can best be removed by the water carriage system, the liquids in (*a*) carrying the solids of (*b*) quietly, quickly and immediately out of the building. There are no sanitary objections to this method. Great objections are, however, raised against house plumbing by the owners of buildings not furnished with plumbing fixtures, the chief being :—

1st. The great first cost.

2nd. The annual charge for water.

3rd. The pipes and fixtures are looked upon as suspicious neighbors.

It is claimed that the first cost is so great that only the rich can be benefited by the sewer system, especially when the water rate is taken into consideration.

There is at first sight some truth in this claim; but the liquid house wastes can be conveyed to the sewer system from the poor man's cottage at a very small expenditure for plumbing, and the water rate will not be increased by adopting the suggestions given further on.

The minimum annual water rate in cities and towns owning

and operating their own water works is generally an amount so small that any tenant can afford it, and by the adoption of the fixtures to be described he will not be called upon to pay more than the minimum rate.

There is no force or truth in the third objection, with proper design, good material and honest workmanship.

It is much easier to "lead" than to "drive" the average rate-payer, even when his own interests (other than the direct financial) are involved—and any attempt to make the construction and use of plumbing fixtures INSIDE all residences compulsory would at the present writing result in total failure in this democratic province.

By the adoption of the suggestions given in this paper, any city or town can improve its sanitary condition in a marked degree without oppressing even the poorest resident with taxation, and without any great expenditure.

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The following schedule shews at a glance the methods the writer would recommend for dealing with domestic and household wastes in different classes of buildings; also the prime cost of connecting with the street sewer and the cost of the necessary plumbing fixtures.

In the majority of cases one house sewer, one outside sink, and one yard hydrant would answer for several houses, thus greatly decreasing cost to each house as here given.



Economical and efficient removal from different classes of buildings.	Cheapest tenements monthly rental not exceeding \$5.00.	Houses in which the monthly rental does not exceed \$12.00.	Houses in which the monthly rental does not exceed \$20.00.	Houses in which the monthly rental does not exceed \$40.00.
a) Liquid house wastes—				
1. Kitchen water (fatty)	Slop sink outside the building.	1 Kitchen sink	1 Kitchen sink	1 Sinks.
2. Washing " (soapy)		2 " "	2 " "	2 Baths, wash-bowls & sink
3. Chamber slops.....		3 Slop sink outside.	3 Water closet	3 Water closet
(b) Night soil .....	Earth or ash closet.	Earth or ash closet.	Water closet.	Water closets.
(c) Kitchen garbage.....	Burned in kitchen stove in whole or in part.			
(d) Ashes .....	Carted away as often as possible with the refuse that cannot be consumed.			
(e) Subsoil water .....	Removed by porous agricultural drain tiles.			
Cost of house sewer.....	\$18 00	\$18 00	\$10 00	\$10 00
" plumbing fixtures ..	12 00	37 00	125 00	180 00
Total first cost .....	\$30 00	\$55 00	\$135 00	\$190 00

In houses indicated in the second and third columns of the above schedule the annual cost for odorless excavating and for removal of garbage and surplus ashes should not exceed \$2.50 per year. In houses of the class mentioned in the last two columns there will be the additional charge for extra water required to flush the water closets, and other fixtures.

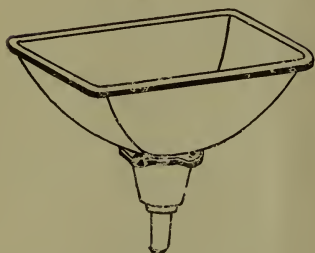
The cost of house sewer does not include the cost of that part of house sewer between the street line and the street sewer.

We will now describe the fixtures mentioned.

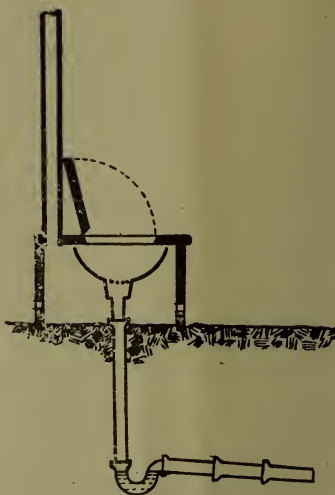
### The Outside Slop Sink.

This slop sink should be of iron, preferably galvanized, and should have a cast iron outlet pipe 3 inches in diameter furnished with a deep trap of the same diameter placed from 3 to 4 feet below the surface of the ground (beyond the effect of frost). The ordinary "Merry Sink," 21½ inches long, 17 inches wide and 9 inches deep, to be had from all dealers in sanitary fix-

tures and illustrated in Fig. 1, answers admirably as it has no corners within that can retain dirt or filth, and the screen over outlet is large and exactly suited for use required. This sink should



(FIG. 1.)



(FIG. 2.)

be covered with a strong box of wood with hinged cover to protect the sink from injury. This box and enclosed sink should be ventilated by boring several holes through the box near the surface of the ground and by carrying a ventilating shaft of wood or sheet metal from the top of the box to some convenient height above the ground away from windows. This sink should be thoroughly and frequently scrubbed, and to prevent improper use of sink the screen or strainer placed over the outlet must be permanently fixed.

Unless kept scrupulously clean this outside slop sink should not be placed in any building or shed, but it may be placed at one side of an outside building; the ventilating shaft being carried up the side of the building. A roof may be built over the fixture if desired.

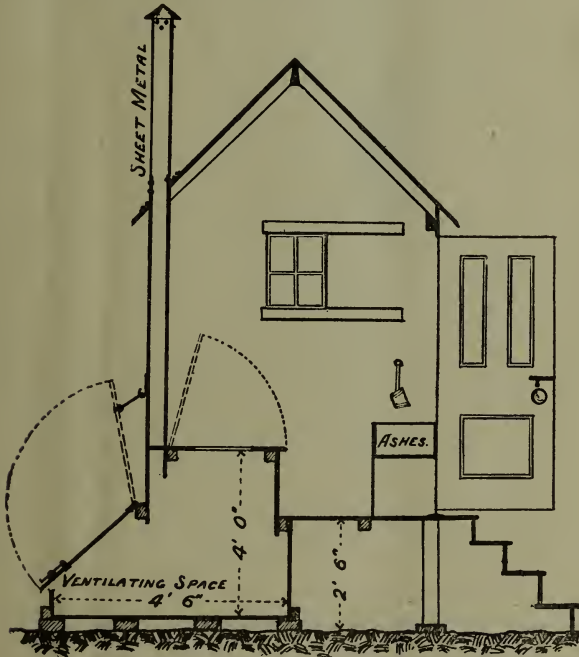
If roof water is permitted to enter the sewer system it would be advisable to allow one rain water leader at least to discharge into this sink.



The yard hydrant for water supply should be located so that drip and waste water can be readily conveyed to this slop hopper.

### The Dry Earth or Ash Closet.

"The dry earth or ash closet used for the "treatment" of night soil should be built according to the "Brantford" plan. Fig. 3 shows the style of closet generally used in Brantford, where there are now about 1,300 in use. Movable drawers, boxes or pails are not used, because in this climate a little moisture freezing in winter makes their removal or emptying difficult. The box is therefore fixed and can generally be arranged so as to be emptied with a shovel by a door or lid in the rear, as shewn in the figure.



(FIG. 3.)

The boxes are made of lumber. A moderately tight box, not sunk in the ground, where no slops are thrown in, good ventilation provided, and a little dry earth or coal ashes thrown in at each use, or even once daily, will not become offensive and will last for half a lifetime. This closet is very cheap. Old privies can easily be changed into ash closets by emptying and cleaning the pits and filling them with clean earth, then raising the structure about two feet, placing the box under and providing a couple of steps. In many places in Brantford they are built under back sheds, etc., with access from the house.

An ample box should be provided within the closet for the coal ashes or dry earth, also a convenient scoop or dish for their application. Dry earth (top soil, never sand) is assumed to be the proper application, but in practice it is little used, being not ready to hand as the coal ashes usually are, and being often not dry. The coal ashes should be kept under cover, they need not be sifted. Wood ashes in practice are found to be offensive. In the public schools in Brantford a shovelful of coal ashes is thrown down each opening once a day by the janitor after the school is closed, and after six years' experience these school closets are proved to be as inoffensive as the best arranged water closets.

These ash closets make no provision for liquid refuse, and it is imperative that no chamber slops or kitchen refuse should be thrown into them. The disposal of such liquid refuse should be by the outside slop sinks connected with drains or sewers. Where there are no such drains or sewers the disposal of such liquid refuse is, in crowded neighborhoods, a difficult problem, and it is not the purpose of this paper to speak of the many expedients resorted to for solving it.

The dry ash closets should be emptied once a month for an ordinary family service or for schools. In other cases a more frequent service may be necessary.

The cost of a monthly service is in Brantford \$1.80 per annum. The average distance to the dumping ground being about  $1\frac{1}{2}$  miles. One man with a one-horse cart easily attends to 600 closets. It is absolutely necessary that a systematic and efficient contract service be provided.

It may be added that while serious difficulties exist in providing dumping grounds for the contents of privy pits and cesspools, no difficulty whatever has arisen as to the dumping of contents of dry ash closets, such being readily disposed of upon market gardens.

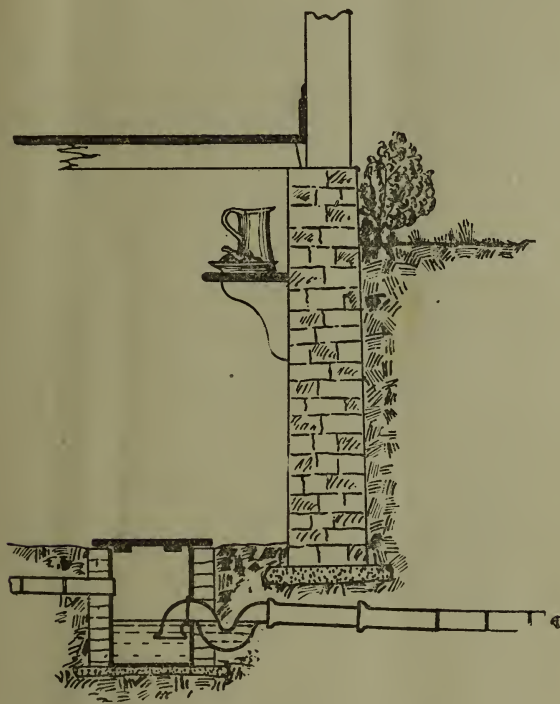
In those of our cities already well provided with sewers, thousands of noisome privy pits still exist. (There are over 12,000 in the City of Toronto). The expense of introducing water closets in the cheaper tenements, the want of a suitable place to locate them where they would not be affected by frost, and the additional water rates required for flushing them, prevent their erection in such tenements. The systematic introduction of dry ash closets in these cases in conjunction with the outside slop sinks offers an effectual means of abating this widespread and dangerous nuisance."

## Garbage.

Combustible garbage can be burned in the kitchen stove, and the ashes not needed for the closet, together with the incombustible garbage and refuse, should be removed periodically by carts.

## Cellar Drainage.

Cellar drainage can be best secured by keeping out surface waters by proper ditches and channels, and by lowering the subsoil water by the use of porous agricultural drain tile as shewn.



(FIG. 4.)

A small well or pit about 2 feet square and 2 feet deep should be built of brickwork about 2 feet from the cellar wall at the point of exit of the drain, this pit to serve as a small catch-basin, preventing entrance into the street tile or house tile of dirt, sand, or other foreign bodies. Into this pit the drain tiles (laid outside the foundation walls, and in wet springy ground, under the cellar floor) should empty.

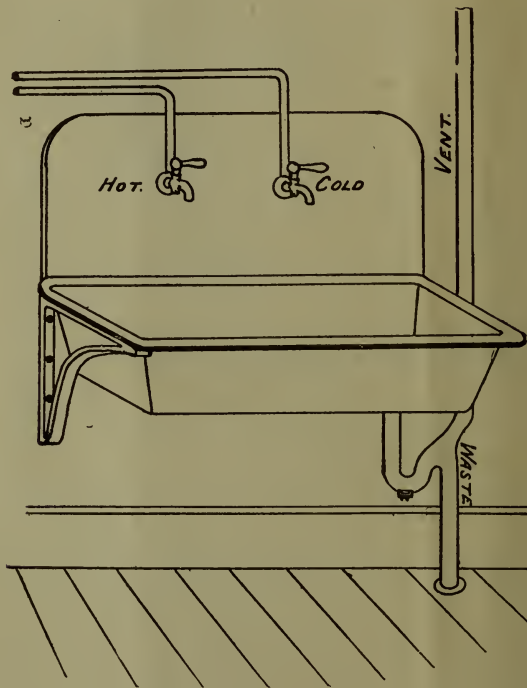
The exit should not be less than 18 inches deeper than the floor of the cellar.

In most cases it is desirable to place a trap on this drain as near the inlet as possible and a fine wire netting should be placed over the inlet.

The cheap cottage, renting at \$5 per month or less, has now been provided for.

### The Kitchen Sink.

In houses renting from \$5 to \$12 per month a kitchen sink is the only inside fixture required, the outside slop hopper being still retained for chamber slops, as well as the dry ash closet for night-soil.



(FIG. 5.)

This sink should be of iron, preferably porcelain lined, properly trapped and the trap ventilated by a pipe not less than 2 inches in diameter, carried through the roof. The waste pipe should be of iron, well coated with asphaltum varnish, with screwed joints or

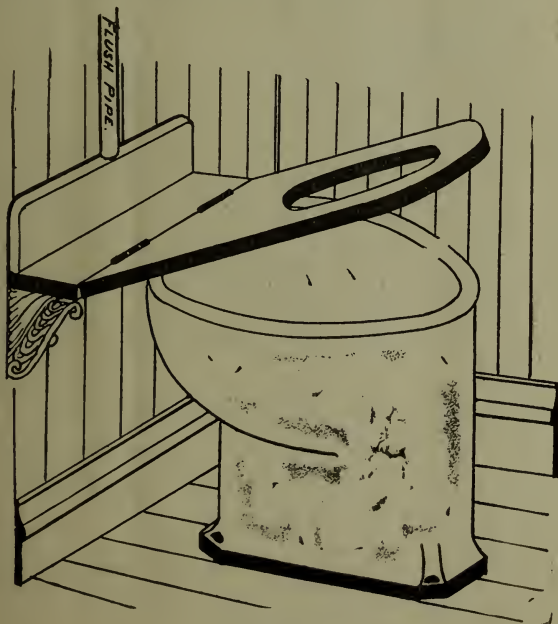
run with lead and caulked. The house sewer should be four inches in diameter, of vitrified salt glazed sewer pipe, except for five feet entering the wall of the house which should be of cast iron "extra-heavy" soil pipe 4 inches in diameter.

The ordinary cast iron sink of the hardware shop, if it has a proper fixed strainer, and if properly supported, and if kept well painted, is perfectly safe and is cheap. Galvanized iron or pressed steel sinks and porcelain lined sinks are better but more expensive.

### Water Closet.

In houses renting for more than \$12 per month a water closet should be substituted for the outside slop sink and the dry-ash closet, this one fixture combining in itself water closet, urinal and slop hopper.

This fixture should be of strong earthenware with all parts easy of access, so that need of cleansing may be apparent to the eye before any other sense is cognizant of the fact.



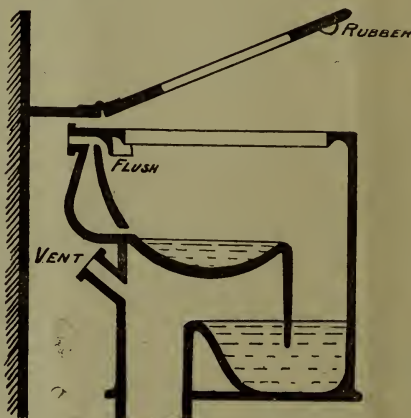
(FIG. 6.)

The closet above shewn is one of the best of the cheaper



closets in the market. It has a broad base, thus being not easily loosened by rough usage. The "horns" for connections are very strong and well proportioned, thus not easily broken off by carelessness or by accident. The outlet is at the front—not obstructed in any way by bends—thus allowing of instant inspection and easy cleansing. The flush is thoroughly effectual and not spattering, as many otherwise good closets unfortunately do. This closet is of so heavy and strong a design that no supports are necessary for the seat, which rests directly on bowl, but rubber cushions should be placed on lower side of the seat. The hinged seat should be counter-balanced to prevent danger from rough usage.

No part of closet pipes or connections should be encased with any woodwork whatever. The wooden seat as shown is all the woodwork that is required.



(FIG. 7.)

The water closet compartment should be well lighted and ventilated by a shaft extending from the ceiling over the fixture to the outer air, to the "cock loft" of the building, or to a flue or chimney; this shaft to be not less than 40 inches in area.

In any building or house only two fixtures are absolutely necessary for the removal of liquid household wastes and the excreta, viz.: the water closet, and the kitchen sink; and except for the great inconvenience the water closet could be made do for both.



In choosing a water closet avoid "pan closets," "plunger closets," "valve closets," and "hopper closets." A simple washout closet in one piece, with front outlet, is the best closet of moderate cost now made.

### Other Fixtures.

The addition of baths, wash bowls, laundry tubs, etc., are conveniences, not necessities; but in putting in a soil pipe "stack" connections should be left for bath at least, and for any other fixtures that will probably be added within a few years. These connections should be securely plugged.

The fewer and more simple the fixtures are, however, the less becomes the possibility of danger from poor plumbing, and the less the first cost and annual maintenance.

### Pipes and Wastes.

The following extracts from By-law 436 of the City of Brantford, "To regulate Plumbing, and secure the Sanitary condition of Buildings," revised by the writer, describes fully the construction of pipes, wastes, traps, etc., within a building.

#### IX.

##### MATERIALS AND WORKMANSHIP.

All materials shall be of the best quality and all work must be executed in a thorough and workmanlike manner. That the work done is as good as is allowed in other cities and towns is to be no criterion of the work done here.

#### X.

From a point three feet outside the foundation walls of a building no materials shall be used to or within the building and connected with the sewer for soil, waste or vent pipe other than wrought iron pipes with screwed joints, cast iron pipes with securely leaded joints, or lead pipes with wiped or soldered joints.

#### XI.

Cement or putty joints, tin or sheet iron pipes, whether galvanized or not, shall not be used inside the building.

#### XII.

When the diameter of any pipe is greater than two inches it shall be of iron.

#### XIII.

No iron pipe shall weigh less than the following:

2 inches in diameter,	5½ lb. per lineal foot.
3 " " "	9½ lb. " "
4 " " "	13 lb. " "
6 " " "	20 lb. " "

Above the highest fixture in the building, however, a four inch soil pipe weighing nine pounds per lineal foot will be permitted.

#### XIV.

No lead, waste or vent pipes shall weigh less than the following

1 inch in diameter,	2 lb. per lineal foot.
1½ " " "	2½ lb. " "
1½ " " "	2½ lb. " "
2 " " "	3½ lb. " "

## XV.

All fittings shall correspond in weight and quality.

## XVI.

Every connection with lead and iron pipes shall be made with brass thimbles or ferrules, having properly wiped or soldered joints, and the ferrules having been properly gasketted, leaded and caulked with the said pipe. Ferrules for 4-inch pipes shall not weigh less than  $2\frac{1}{2}$  lbs.; for 3-inch pipe not less than  $1\frac{3}{4}$  lbs., and for 2 inch pipe not less than  $1\frac{1}{2}$  lbs., each ferrule not to be less than 4 inches in length.

## SOIL PIPES, WASTE PIPES, ETC.

## XVII.

The main pipe from the sewer connection to the top shall be fully 4 inches in internal diameter at every point.

## XVIII.

No trap or other obstruction to the free flow of air through the whole course of the house sewer and soil pipe shall be placed on soil pipe or house sewer.

## XIX.

Rule 2, section 15, of by-law appended to the Public Health Act, chap. 205, Revised Statutes of Ontario, is hereby repealed.

## XX.

Every vertical soil pipe must be extended at least 4 feet above the roof of the building and above any window within a distance of 30 feet. The end of the pipe shall be left open or with wire basket end, without a return bend, hood or curve.

## XXI.

No soil pipe or waste pipe shall have at any part a less fall than one-fourth inch to the foot. The fall must be towards the outlet.

## XXII.

Each house or building must have its own separate soil pipe or drain, and such soil pipe or drain shall be so placed as to be always readily inspected without excavation or destruction to walls or floors, and the plumber shall be responsible for the proper connection of his work with the system of sewers; and no two or more houses or buildings shall have drain in common until each separate drain shall have passed outside the walls of the house or building which it serves.

## XXIII.

The arrangement of soil and waste pipes shall be as direct as possible.

## XXIV.

In no case shall pipes, fixtures and traps be placed in inaccessible positions in a building.

## XXV.

All waste pipes from fixtures should be carried up through the roof, the same as a soil pipe, the diameter to be not less than three inches where it passes through the roof, to prevent obstruction from frost. The waste pipes from different fixtures may be branched together and pass upward to roof, or may be connected with the main soil pipe, above the inlet from the highest on it.

## XXVI.

The drain pipe from refrigerator or other receptacle where provisions are stored shall not be connected with any waste pipe, soil pipe or sewer; it should discharge into some sink or basin supplied with water.

## XXVII.

When there is a safe under a water closet, bath, urinal, wash-basin, sink or other fixture, it must be drained by a special pipe not directly connected with any waste pipe soil pipe or sewer, but discharging into some place in open sight.

## TRAPS AND VENTS.

## XXVIII.

Every water closet, urinal basin, sink, wash tray, bath tub, and every tub or set of tubs, must be separately and effectually trapped as near the fixture as possible, and never more than two feet therefrom.

## XXIX.

Every trap must be vented either by continuing the waste pipe, as in section 26, or by a special vent pipe connected with the crown of each trap, and extending above the inlet from the highest fixture on it. The vents may be combined by branching together those that serve several traps. These vent pipes must always have a continuous slope, to avoid collecting water by condensation.

## XXX.

Water sealing traps of any pattern approved of by the Engineer or Inspector of Plumbing may be used when separate air pipe connections from the top of the same are provided.

## XXXI.

In putting in plumbing fixtures in old buildings separate air pipe connections or vents may be omitted when traps that cannot be unsealed and such as are approved of by the Engineer are used.

## XXXII.

No trap or vent pipe shall be used as a waste or soil pipe.

## XXXIII.

No brick, sheet metal or earthenware pipe or chimney flue shall be used as a sewer ventilator, nor to ventilate any trap, drain, soil or waste pipe.

## XXXIV.

No closet or other convenience which allows the escape into the house of air or gas which has been confined in any part of it, or from the drain or soil pipe, or which allows the accumulation of filth in or about it, shall be fitted up or used.

## WATER CLOSETS.

## XXXV.

Pan closets are strictly prohibited.

## XXXVI.

In no classes of buildings will water closets be permitted in the cellars or basements without special means of lighting and ventilating being provided and approved of by the Engineer or Inspector of Plumbing and the Medical Health Officer.

## XXXVII.

All water closets must be supplied with a sufficient quantity of water to keep them at all times clean and well flushed, and should be supplied from a tank from which water is not drawn for any other purpose. Direct service of a water closet is not permitted.

## XXXVIII.

The trap to water closet must be ventilated by a vent pipe not less than two inches in diameter.

## XXXIX.

If a seat ventilating pipe is used it should be carried to the outside air, and must not be connected with the soil pipe.

## XL.

The overflow pipe from the water closet cistern shall not be directly connected with the soil pipe of any fixture.

## XLI.

Rooms in which water closets are placed shall be ventilated into the cock-loft, or into the external air in a manner approved of by the Engineer or Inspector of Plumbing and the Medical Health Officer.

## BATH TUBS, SINKS, WASH BASINS, ETC.

## XLII.

All wash trays, sinks, etc., must be of non-absorbent material. Wooden ones are prohibited inside of buildings.

## XLIII.

The waste pipe from any fixture shall not be connected with the trap of a water closet or of any other fixture.

## XLIV.

Exit pipes to all fixtures except water closets shall be furnished with suitable permanently attached strainers.

## XLV.

The vent pipe to traps of all fixtures but water closets shall not be less than one and a quarter inches in diameter, except when more than fifteen feet in length, when they shall not be less than one and a half inches in diameter.

## XLVI.

Overflow pipes from fixtures must in each case be connected on the inlet side of the trap.

## XLVII.

Sinks in all hotels, restaurants, boarding houses, laundries or other places where the Engineer or Inspector of Plumbing may direct, shall be provided with suitable grease traps.

## CARPENTER WORK.

## LV.

No woodwork shall in any case be placed at the front or sides of a water closet bowl, enclosing the same, without the permission of the Engineer. The seat shall be hinged in such a manner that when thrown back the bowl will be exposed on all sides.

## LVI.

Where either vertical or horizontal pipes are enclosed small doors must be so placed that all parts shall be accessible at all times.

## LVII.

Traps, bends, elbows and connections should not be placed beneath floors; otherwise trap doors (not screwed down) shall be so placed that all such traps, bends, elbows, connections, etc., can be readily examined at any time.

The first cost of a house sewer with soil pipe through roof, kitchen sink with trap and ventilating pipe, water closet with vent, everything necessary to remove all liquid house wastes and excreta without danger or offence to the owner, should not exceed \$150, provided the house is not distant more than 25 feet from the street line and is not more than  $2\frac{1}{2}$  stories high.

House plumbing and sewer connections should be under the control of the City Engineer in all cases, with the Board of Health and their officers as a court of appeal in particular cases. The City Engineer should also see that the fixtures are kept in repair.

The sanitary department should have charge of the scavenging, removal of night soil, garbage, ashes, etc., for which service householders should be taxed according to a fixed tariff.

The methods outlined are not Utopian, but such as are now prescribed in Brantford, and in part in Brockville and other places in the Province and applicable, to any city or town.

But little advance can be made in civic sanitation, however, until the "privy pit" and its twin sister the "cesspool" are abolished, and until systems of waterworks and sewers are introduced.

WILLIS CHIPMAN.

TORONTO, 1st May, 1891.

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